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Journal of Hydrology: Regional Studies

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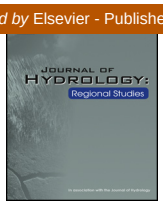

Editorial for Journal of Hydrology: Regional Studies

Hydrological regimes and processes show strong regional differences. While some regions are affected by extreme drought and desertification, others are under threat of increased fluvial and/or pluvial floods. Changes to hydrological systems as a consequence of natural variations and human activities are region-specific. Many of these changes have significant interactions with and implications for human life and ecosystems. Amongst others, population growth, improvements in living standards and other demographic and socio-economic trends, related changes in water and energy demands, change in land use, water abstractions and returns to the hydrological system (UNEP, 2008), introduce temporal and spatial changes to the system and cause contamination of surface and ground waters. Hydro-meteorological boundary conditions are also undergoing spatial and temporal changes. Climate change has been shown to increase temporal and spatial variations of rainfall, increase temperature and cause changes to evapotranspiration and other hydro-meteorological variables (IPCC, 2013). However, these changes are also region specific. In addition to these climate trends, (multi)-decadal oscillatory changes in climatic conditions and large variations in meteorological conditions will continue to occur.

To preserve or improve our living conditions under these hydrological system changes, water resources management and engineering has to evolve and adapt. Effective and sustainable management of our water resources depends on management and policy that is adapted to the specific conditions of the region considered. Examples of such conditions are the region-specific hydro-climatology, geology, geography, human and ecological demands for good quality water.

Sound scientific understanding of how the regional hydrology depends on both natural and anthropogenic conditions and changes in both, requires advanced knowledge and insights, not only of the regional processes themselves but also of the links between hydrology, climate, landscapes and human activities (Batelaan et al., 2013; Montanari et al., 2013; Merz et al., 2014). As discussed by Harte (2002), this demands for place-centered studies ("*science of place*"), because it allows us to study actual field hydrological processes in their full complexity and to compare hydrological behavior to other sites and upscale or generalize to larger regions. Addressing the larger scale, or even global, water resources problems is only achievable through scientific understanding and action at local and regional level, as was stressed by the US National Research Council in their report on the 'Challenges and opportunities in the hydrological sciences' (NRC, 2012).

Apart from the issue of regional differences, there is a strong need to move further toward interdisciplinarity and translational science. "*Interdisciplinarity in hydrological science*" allows us to make much

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better use of new technology for measurements, data analysis and simulation, also takes into account ecological, social, economic, management and political aspects. There is a strong need to strengthen the process of translation of new hydrological insights to decision making such as water management and engineering and vice versa. There is a need for "*translational science*" where the science is brought to the decision level, and for the problems and needs from the management and decision level to reach the scientists so that management strategies are taken into account and evaluated by the scientists and the findings effectively communicated to the water policy makers and managers. This requires that the science–policy interface process is further developed (Quevauviller, 2009). Given the existing temporal climate variations and the significant uncertainties in future changes of climate, land use, demographic conditions, etc., as well as the imperfect knowledge of the integrated hydrological system, the design of sustainable management solutions has to acknowledge these uncertainties in our ability to quantify hydrological processes and interactions. Hence, it is essential to integrate uncertainty estimation approaches into the science–policy interface process and move hydrological science from being just interesting to also being useful and important to society and an essential key in proactive decision making (Hunt and Doherty, 2011). Strengthening the interdisciplinarity and translational science can most effectively be achieved by working together at the regional level (NRC, 2012), further demonstrating the importance of regional hydrological studies.

This new *Journal of Hydrology: Regional Studies* targets this need for regional hydrological studies. It can be seen as a sister journal of the *Journal of Hydrology*. Whereas *Journal of Hydrology* continues receiving manuscripts on methods and synthesis studies in the field of hydrology, *Journal of Hydrology: Regional Studies* particularly welcomes research papers that deliver new insights into region-specific hydrological processes and responses to changing conditions, as well as contributions that incorporate interdisciplinarity and translational science, the future importance of which was highlighted above.

Journal of Hydrology: Regional Studies is a new Gold Open Access journal that publishes original research papers enhancing the science of hydrology for studying region-specific problems, past and future conditions, analysis, review and solutions. The journal topics covered include:

- surface and subsurface catchment hydrology;
- impacts of climatic and land use change on natural hydrologic processes and water resources;
- hydrologic process observations, modeling and prediction;
- innovative solution strategies for water management issues in transboundary basins and groundwater;
- economic hydrology;
- hydrology and livelihoods;
- cultural and social water allocation;
- social impacts of water infrastructure.

The journal has four regional editors, one for each of the regions: Asia-Pacific (Okke Batelaan), Africa (Denis Hughes), Americas (Peter Swarzenski), and Europe (Patrick Willems).

The review process is very similar to the *Journal of Hydrology* but will aim to publish final manuscripts with objectives, methods, results and conclusions particularly well-articulated and clearly identified. In order for the readers of the journal to benefit from easy and understandable access to the papers the editors have introduced a new type of abstract with clearly identifiable subsections:

1. Study Region
2. Study Focus
3. New Hydrological Insights for the Region

Under the first subsection "Study Region" the location or region of study (e.g. river basin, country) is described. The second subsection "Study Focus" summarizes the aim and the method of the hydrological study. The third subsection "New Hydrological Insights for the Region" finally highlights the new understanding on the region specific hydrology that is gained from the paper.

The Gold Open Access policy of the journal means that the full international hydrological, as well as the non-specialist community, will benefit from free and permanent access to the science

results and the possibility of downloading the published papers. This is of course also a great advantage for the authors in terms of having the potential to reach a much wider audience, including regional hydrological authorities who may not have wide access to the scientific literature. The authors pay for getting their paper published, *but only once their paper is accepted*. Elsevier will give a 90% and 50% reduction on the standard publication fee during 2014 and 2015, respectively. For authors belonging to low income countries, Elsevier has a program to waive fees as part of Research4Life (http://www.research4life.org/institutions/).

As is the case for *Journal of Hydrology*, we strive for excellence in the scientific content of papers that are accepted and to work together with authors toward a seamless and expedited review and dissemination process. Since its launch in autumn 2013, we received 46 manuscripts from the four regions, and have a rejection rate of about 80%. *While we expect this rate to decrease, it shows* our systematic aim for quality.

This first issue sets the scene for the journal by presenting a broad range of regional hydrological studies. The first two papers are nice examples of integrated regional hydrological studies considering human demands for water and energy, and which directly provided policy information. The study by Best and Lowry (2014) discusses the hydrological effects of large water withdrawals related to the development of natural gas resources within the Marcellus Shale, New York State, USA. They consider the integrated, hydraulically connected groundwater and surface water systems in the area. The other study by Kling et al. (2014) quantifies the impact of both water management and climate change scenarios on the future surface water availability in the Zambezi basin in southern Africa. The planned water management projects consider large scale irrigation projects and the construction of new hydropower plants. Despite strong modeling challenges associated with the vast area of the basin, the data scarcity and the complex hydrology, clear new insights were obtained on the relative importance of different types of change.

The climate scenarios were in the study by Kling et al. (2014), as in most climate change impact studies, based on simulation results with coarse scale circulation models. That one has to be careful with the use of such models for particular study regions, is clearly demonstrated in the paper by Rana et al. (2014) for monsoon rainfall intensities over Mumbai. They show the benefit of combining physics based models with statistical methods. By combining the circulation models with an advanced method of statistical downscaling, significant positive trends of mean and extreme rainfall were projected, which may bring severe future increase in flood risks in the region.

Two other papers in this first issue combine measurements with models to provide new insights on water quality conditions and trends. Saaltink et al. (2014) show for the Baltic Sea drainage basin how the spatial distribution of trends in nitrogen and phosphorus are in relation to societal, land cover and climatic changes. Based on this enhanced understanding of the mechanisms that control the water quality in the basin, focused and effective strategies could be advised for nitrogen and phosphorus reduction and retention. Because people in the basin strongly rely on many ecosystem services that are vulnerable to eutrophication, water quality control and improvement are of high importance for that region. Another type of water quality problem was explained by McPhillips et al. (2014) for Chenango County in central New York State. They consider the risk of methane contamination in groundwater in relation to planned future shale gas development using hydraulic fracturing. Based on a statistical model, existing baseline conditions were studied. Bedrock interactions and lengthy residence times were found to be the primary and significant environmental drivers of the observed methane patterns. These studies again show that both process based models and statistical models/methods have their merit in regional hydrological research.

That models can play an important role, also in translational science – to enhance the application of the available scientific knowledge in support of decision making – is nicely demonstrated by Archibald et al. (2014). They show how a parsimonious semi-distributed hydrologic model can be applied for identifying critical runoff source areas by saturation excess in the northeastern USA. Such a model may serve as a decision support or real-time control tool, e.g. to limit agricultural pollution. Another interesting application, presented by Sharma and Panu (2014) for northwest Ontario and eastern Canada, is the prediction of hydrological drought parameters at different time scales, based on river flow series using probability based models.

For future issues, we welcome both regular paper submissions and special issues on specific regional hydrological themes. A first special issue on the '*Groundwater Systems of the Indian Sub-Continent*' is in preparation and more will follow soon on Africa, South America, North America, and Europe.

We warmly thank the manuscript authors, the numerous reviewers and the guest editors of the special issue for their efforts in writing, reviewing and providing valuable suggestions for improvements. The journal was made possible thanks to the initiative and efforts of Elsevier publisher Dr. Christiane Barranguet and the extensive support provided by journal manager, Prahba Saskia. We are all looking forward to future, inspiring manuscripts and initiatives for special issues on pressing regional hydrological topics. We thank all the readers for their interest in the journal and gladly receive future submissions as well as feed-back to further develop *Journal of Hydrology: Regional Studies*.

For the full aims and scope visit the journal webpage at http://www.elsevier.com/locate/ejrh.

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